nucleic acid molecule is single-stranded, it can be either a sense or an antisense strand. Fragments of these molecules are also considered within the scope of the invention, and can be produced, for example, by the polymerase chain reaction (PCR), or by treating a longer fragment (*e.g.*, a full-length GLUTX gene sequence) with one or more restriction endonucleases. Similarly, a full-length GLUTX mRNA molecule, or a fragment thereof, can be produced by *in vitro* transcription. The isolated nucleic acid molecule of the invention can encode a fragment of GLUTX that is not found as such in the natural state. Although nucleic acid molecules encoding any given fragment of GLUTX are within the scope of the invention, fragments that retain a biological activity of GLUTX are preferred.

The nucleic acid molecules of the invention encompass recombinant molecules, such as those in which a nucleic acid molecule (*e.g.*, an isolated nucleic acid molecule encoding GLUTX, or a fragment thereof) is incorporated: (1) into a vector (*e.g.*, a plasmid or viral vector), (2) into the genome of a heterologous cell, or (3) into the genome of a homologous cell, at a position other than the natural chromosomal location. Recombinant nucleic acid molecules, transgenic animals, and uses therefor are discussed further below.

The nucleic acid molecules of the invention can contain naturally occurring sequences, or sequences that differ from those that occur naturally, but, due to the degeneracy of the genetic code, encode the same polypeptide. In addition, the nucleic acid molecules of the invention are not limited to those that encode the amino acid residues of the GLUTX polypeptide encoded by SEQ ID NO: 2; they can also include some or all of the non-coding sequences that lie upstream or downstream from a GLUTX coding sequence, a

heterologous regulatory element, or a sequence encoding a heterologous polypeptide (*e.g.*, a reporter gene). Regulatory elements and reporter genes are discussed further below.

The nucleic acid molecules of the invention can be synthesized (for example, by phosphoramidite-based synthesis) or obtained from a biological cell, such as the cell of a mammal. Thus, the nucleic acids can be those of a human, mouse, rat, guinea pig, cow, sheep, goat, horse, pig, rabbit, monkey, dog, or cat. Combinations or modifications of the nucleotides within these types of nucleic acid molecules are also encompassed.

In the event the nucleic acid molecules of the invention encode or act as antisense molecules, they can be used, for example, to regulate translation of GLUTX mRNA. Techniques associated with detection of nucleic acid sequences or regulation of their expression are well known to persons of ordinary skill in the art, and can be used in the context of the present invention to diagnose or treat disorders associated with aberrant GLUTX expression. However, aberrant expression of GLUTX (or aberrant activity of GLUTX) is not a prerequisite for treatment according to the methods of the invention; the molecules of the invention (including the nucleic acid molecules described here) are expected to be useful in improving the symptoms associated with a variety of medical conditions regardless of whether or not the expression of GLUTX (or the activity of GLUTX) is detectably aberrant. Nucleic acid molecules are discussed further below in the context of their clinical utility.

The invention also encompasses nucleic acid molecules that encode other members of the GLUTX family (*e.g.*, the murine homologue of GLUTX). Such nucleic acid molecules will be readily identified by the ability to

hybridize under stringent conditions to a nucleic acid molecule encoding a GLUTX polypeptide (*e.g.*, a nucleic acid molecule having the sequence of SEQ ID NO:1). The cDNA sequence described herein (SEQ ID NO:1) can be used to identify these nucleic acids, which include, for example, nucleic acids that encode homologous polypeptides in other species, splice variants of the GLUTX gene in humans or other mammals, allelic variants of the GLUTX gene in humans or other mammals, and mutant forms of the GLUTX gene in humans or other mammals.

The preferred class of nucleic acid molecules that hybridize to SEQ ID NO:1 are nucleic acid molecules that encode human allelic variants of GLUTX. There are two major classes of such variants: active allelic variants, naturally occurring variants that have the biological activity of GLUTX and non-active allelic variants, naturally occurring allelic variants that lack the biological function of GLUTX. Active allelic variants can be used as an equivalent for a GLUTX protein having the amino acid sequence encoded by SEQ ID NO:1 as described herein whereas nonactive allelic variants can be used in methods of disease diagnosis and as a therapeutic target.

The invention features methods of detecting and isolating such nucleic acid molecules. Using these methods, a sample (*e.g.*, a nucleic acid library, such as a cDNA or genomic library) is contacted (or "screened") with a GLUTX-specific probe (*e.g.*, a fragment of SEQ ID NO:1 that is at least 17 nucleotides long). The probe will selectively hybridize to nucleic acids encoding related polypeptides (or to complementary sequences thereof). The term "selectively hybridize" is used to refer to an event in which a probe binds to nucleic acid molecules encoding GLUTX (or to complementary sequences thereof) to a detectably